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construction innovation

NRC · CNRC

Researchers learn from World Trade Center survivors' accounts

Immediately following the attack on the World Trade Center on September 11, 2001, journalists began interviewing survivors to obtain stories of their evacuation. These first-person accounts were presented on television or radio and published in newspapers, magazines or on Web sites. In the days following the tragedy, NRC, in collaboration with the National Fire Protection Association (NFPA), decided to collect these survivors' stories to help document the event. In three months, over 280 first-person accounts were collected. The information in some accounts was so detailed that it provided sufficient material for a study. Additional accounts were gathered up until late September 2002, for a total of 480.

The use of first-person accounts as the main source of information for a study is unusual because of the inherent limitations of this approach: The actual questions that journalists asked the survivors are unknown, and important information could have gone unreported or been adapted to fit the objectives of the article. Because all survivors were not systematically asked the same questions, it is impossible to compare accounts and generalize results. However, some accounts are so richly detailed, particularly those written by the survivors themselves, that it was considered important to analyze this information.

World Trade Center, September 11, 2001
Photo courtesy Scott Demel

Researchers conducted a content analysis of the 480 first-person accounts. The information was coded and entered in a database using variables such as cues perceived by occupants, conditions on a particular floor and means of egress. Because some survivors had given accounts of their evacuation to more than one journalist, and these accounts varied from each other, the accounts were merged for a total of 324 survivor accounts.

The preliminary results show that there were more accounts from Tower 1 survivors than from Tower 2 survivors (57% vs 39%, with 4% from elsewhere in the World Trade Center complex). Those who gave reports were between the ages of 21 and 89, and almost three-quarters of them were male.

For 29% of the survivors of Tower 1 who provided accounts, the first cue that something unusual was happening was related to building movement—many thought the building was going to tip over. For the Tower 2 survivors, the most common initial cue was some kind of visual information, such as flames, smoke or falling paper. After perceiving these cues, 55% of the

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2007-03610/

CCMC evaluates auger-installed steel piles

IRC's Canadian Construction Materials Centre (CCMC) has just evaluated a product that gives builders in Canada another option for a foundation system to support various building constructions such as decks, sun rooms, carports, cottages and storage sheds. The product, Techno Pieux™/Techno Metal Post, was evaluated against technical requirements developed by CCMC for this type of product and was found to meet these requirements.

Product ... gives builders in Canada another option for a foundation system to support various building constructions such as decks, sun rooms, carports, cottages and storage sheds.

Techno Pieux™/Techno Metal Post is an earth anchor constructed of helical-shaped, circular steel blades welded to a steel shaft. The blades, which can be single, double or triple and which are located at appropriate spacing on the shaft, have a controlled pitch and are available in diameters of 150 mm to 600 mm. The diameter of the helix, or blade, is chosen on the basis of the bearing pressure of the soil and the load the pile is required to support. The shaft is available in various diameters and wall thicknesses and is covered with a ribbed polyethylene pipe, which acts as a frost sleeve to isolate the pile and keep it from being subject to annual frost heave in the surrounding soil. This foundation system comes with various other accessories, such as support plates, to facilitate adaptation to the building structure, extension shafts and connectors.

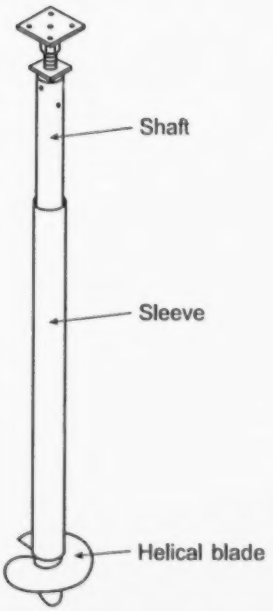
The product works as follows: Blades are screwed into the ground using mechanized equipment with sufficient applied downward pressure (crowd) so that the anchor advances one pitch per revolution until the appropriate bearing stratum is reached or the applied torque value attains a specified value. The central shaft transmits torque during installation and transfers axial loads to the helical blades. It also provides a major component of the resistance to lateral loading. Extensions can be added to the shaft as needed. Applied loads may be tensile (uplift), compressive (bearing), or some combination of the two. Helical anchors can be rapidly installed in various soil formations, using a variety of readily available equipment, and can be loaded immediately after installation.

The requirements and the performance criteria for auger-installed steel piles cover issues such as

- structural performance
- methods used to assess the bearing capacity on site, and
- installation techniques.

As well, in the design of auger-installed steel piles, it is accepted practice to correlate the torque applied during installation to the ultimate axial and tensile capacities. The CCMC evaluation established and documented this correlation as part of its report.

The complete evaluation report, #13059-R, is available free of charge online at http://irc.nrc-cnrc.gc.ca/ccmc. For further information, contact Mr. Alphonse Caouette at (613) 993-6917, fax (613) 952-0268, or e-mail alphonse.caouette@nrc.gc.ca.



An auger-installed steel pile, Techno Pieux™/Techno Metal Post

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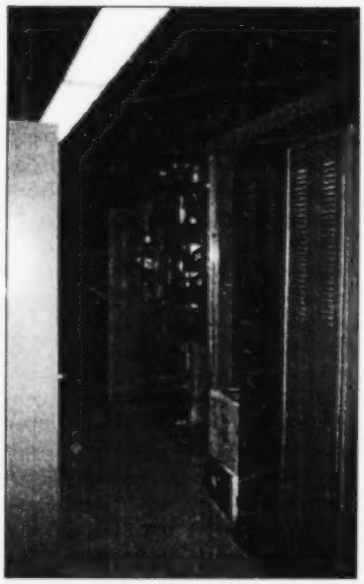
IRC and University of Ottawa investigate new fibre-optic fire-detection system

Fire researchers at IRC, in collaboration with the University of Ottawa, are studying the feasibility of a new fibre-optic-based fire-detection system. The system is expected to reduce false alarms and provide early detection of fires in areas with restricted access or difficult ambient conditions, such as aircraft, tunnels, underground railways and stations, telecommunication facilities, and nuclear and petrochemical plants.

Fires that are not detected until they have fully developed are a serious problem and can result in extensive property damage and loss of life. However, an optical fibre detector, unlike a conventional thermal detector that determines temperature change at a single location, can measure the temperature at any and every point along cables of up to 100 km in length. The maximum temperature that can be measured is limited only by the durability of the fibre.

A fibre-optic cable system is much more sensitive to temperature fluctuations than conventional heat detectors. This increased sensitivity means that such a system may be able to detect fires earlier than is now possible, or even detect small fires. The technology also reduces the problem of false alarms because the system is immune to many kinds of interference. In addition, the cable is strong, resilient and flexible, and can be directly placed near or inside protected facilities, providing greater accuracy in terms of locating the fire and determining its size.

The initial research established the relationship between the light signal and the fibre temperature. By measuring the signal gain versus time, the fibre-optic system can provide a real-time temperature measurement. These experiments have successfully used long optical fibres (11 and 22 km) for monitoring real-time temperature variations.



Fires can be difficult to identify and locate in restricted or inaccessible spaces, such as those sometimes found in telecommunication facilities.

The research has demonstrated the feasibility of using distributed optical fibre sensors for fire-detection applications. The next step is to study and evaluate the performance of this technology in real fire conditions, such as those sometimes found in telecommunications facilities and tunnels.

Those interested in joining this research project or those with specific questions should contact Dr. Zhigang Liu at (613) 990-5075, fax (613) 954-0483, or e-mail zhigang.liu@nrc.gc.ca.

Researchers learn from World Trade Center survivors' accounts

Continued from cover page

survivors of both towers started to evacuate immediately; 13% stopped to retrieve belongings before leaving; 20% conducted several activities, such as securing files and searching floors, before beginning to evacuate. As for the rest, initially, 8% decided to stay, but then changed their minds, and 4% were stuck because collapsing ceilings and walls blocked their way, but then managed to escape. It appears that 83% of these survivors judged the situation to be very serious in the first few minutes after the strike although most of them had limited knowledge of what had really happened.

In Tower 1, all survivors who gave accounts used the stairs to evacuate. In Tower 2, 81% used the stairs, 6% the elevators, and 13% a mix of elevators and stairs. Two-thirds of the survivors who used the elevators were from floors above the 78th floor sky lobby (an area where people change elevators) and one-third were from floors between the sky lobbies on the 44th and 78th floors. Many commented on how calm and helpful occupants were during the evacuation.

The study of first-person media accounts is unusual in the field of human behaviour in fire. However, the number of accounts and the quality and degree of detail they contain deserve careful examination. A full report on the analysis of the first-person accounts is expected to be available soon on the IRC Web site at http://irc.nrc-cnrc.gc.ca.

For more information, please contact Dr. Guylène Proulx at (613) 993-9634, fax (613) 954-0483, or e-mail guylene.proulx@nrc.gc.ca.

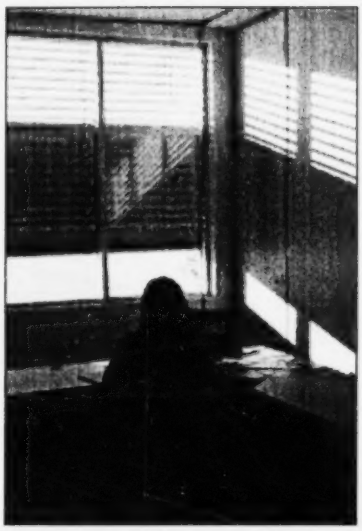
Recent daylighting activities at IRC

Daylighting is the capturing of solar energy with the goal of optimizing the availability of glare-free, natural daylight to light the interior of a building. It is mainly used in commercial buildings, where the times of daylight availability and building occupation generally coincide. The benefits of a carefully planned daylighting concept can range from enhanced visual comfort for occupants to reduced energy demand for lighting, heating and cooling. Three recent IRC projects that aim to optimize these benefits are:

- **DAYSIM**, free software used to predict the availability of daylight and electric lighting energy demands in individual offices with manually and automatically controlled lighting and blind systems.
- **SkyVision**, a software tool that allows for detailed calculations of the optical characteristics of various skylight shapes and types, as well as the availability of indoor daylight, and predicts the energy saving potential of these skylights.
- **IRC's daylighting laboratory**, a new facility that will allow IRC to expand its previous work on the interactions of people with electric lighting in offices to include daylighting and advanced controls.

DAYSIM daylighting analysis software now available on Web

DAYSIM is a daylighting analysis software that simulates the annual amount of daylight in a building. It also estimates the demand for lighting energy for both manually and automatically controlled lighting and blind systems. The target user groups are architects and lighting designers who want to implement daylighting in their designs. The development of this software has been jointly funded by NRC and the Fraunhofer Institute for Solar Energy Systems in Freiburg, Germany.



Internal view of a split blind system in IRC's new daylighting laboratory

The benefits of a carefully planned daylighting concept can range from enhanced visual comfort for occupants to reduced energy demand for lighting, heating and cooling.

DAYSIM is based on the RADIANCE software from Lawrence Berkeley National Laboratories and uses the same input files. One of its unique features is that it combines daylight simulations with a user behaviour model based on field studies in office buildings throughout the Western world.

To date, DAYSIM has been downloaded by 120 users from 30 countries affiliated with 37 architectural and consulting firms and 44 research institutions. To download, simply go to http://irc.nrc-cnrc.gc.ca/ie/light/daysim.html.

For more information, please contact Dr. Christoph Reinhart at (613) 993-9703, fax (613) 954-3733, or e-mail christoph.reinhart@nrc.gc.ca.

SkyVision predicts skylight performance

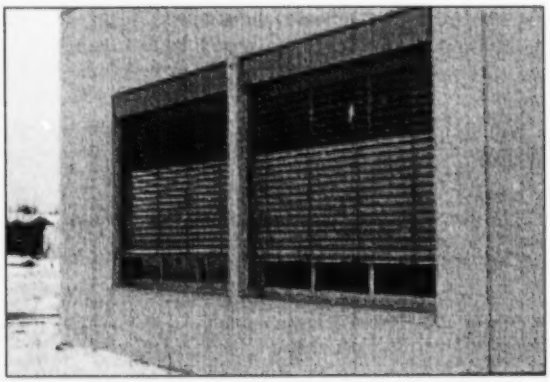
IRC has just released the first beta version of its skylight software, SkyVision, for testing and evaluation by end-users such as skylight and curb manufacturers, building designers, architects and engineers. SkyVision is an easy-to-use, Windows-based computer program developed by NRC in partnership with Natural Resources Canada and Public Works and Government Services Canada.

The software takes into account skylight shape and type of glazing, indoor space geometry and surface paints, lighting and shading controls, and environmental conditions such as location and prevailing sky/ground conditions. For any given day, it calculates the overall optical characteristics of various skylight types, the performance of the glazing and the assembly at a particular angle relative to the sun's altitude, indoor daylight availability and lighting energy savings.

To download the beta version of SkyVision go to http://irc.nrc-cnrc.gc.ca/ie/light/skyvision/index.html. If you would like to comment on or make suggestions on how to improve the software, please contact Dr. Aziz Laouadi at (613) 990-6868, fax (613) 954-3733, or e-mail aziz.laouadi@nrc.gc.ca.

IRC has a new daylighting laboratory

The Indoor Environment Program has commissioned a new daylighting laboratory, which will be used to expand its internationally recognized work on the human factors related to lighting to encompass daylighting. The new facility consists of two identical offices with a curtain wall that covers the south facade of each office. The curtain wall is flexible, allowing different components to be substituted for experimental purposes.



Outside view of daylighting laboratory showing the external split blind system with the slats closed in the lower part, to block direct sunlight, and open in the upper part, to admit daylight deep into the space.

A new daylighting laboratory ... will be used to expand IRC's internationally recognized work on the human factors related to lighting to encompass daylighting.

The IRC Indoor Environment Program's Research in the new laboratory will focus on the performance of innovative and conventional lighting and façade components in occupied spaces, and will investigate such issues as:

- how office occupants use lighting and shading controls in daylit spaces;
- user preferences, satisfaction and acceptance of automated lighting and shading systems;
- photometric and energy performance of innovative façade components and lighting systems.

The daylighting laboratory is equipped with independent heating/cooling units that permit control of the thermal environment and a lighting system that accommodates changes in types of lighting systems and controls. The flexibility of the façade permits individual glazing units to be replaced, and indoor and outdoor shading devices (controlled manually or by photocells) to be installed. The laboratory also has state-of-the-art equipment for monitoring indoor lighting and thermal conditions, as well as lighting, cooling and heating energy consumption. The first study, on lighting preferences and mood in daylit offices, is just getting underway.

For more information about this facility, please contact Ms. Anca Galasiu at (613) 993-9670, fax (613) 954-3733, or e-mail anca.galasiu@nrc.gc.ca.

Newsbrief

International indoor environment conference to run concurrently with CIB 2004

When the world's leading experts on building and construction from industry, education and the research community assemble in Toronto in May 2004 for the CIB World Building Congress, they will be joined by their colleagues from the indoor environment field.

The 5th International Conference on Indoor Air Quality, Ventilation and Energy Conservation in Buildings is being held in conjunction with CIB 2004 to ensure that participants travelling to Canada from around the globe have as much chance as possible to exchange ideas on building and construction issues.

One of the goals of the Conference is to address the issues of indoor air quality, lighting, thermal comfort, energy, health, and occupant satisfaction—issues of utmost importance given that most Canadians spend about 90% of their time indoors—with an integrated approach. This approach is more in keeping with sustainable development and whole-building performance because it looks at ways of maintaining a comfortable indoor environment while minimizing the building's impact on greenhouse gases (GHG), as well as on land and resource use.

"The partnership with CIB 2004 is a natural fit," says Dr. Fariborz Haghighat of Concordia University, who is organizing the event in cooperation with NRC's Institute for Research in Construction (IRC). "It will allow participants from 40 to 60 countries a chance to exchange ideas on issues related to indoor environment and provide an excellent forum for discussion."

CIB is an organization that represents professionals worldwide and supports R&D that considers a building and its occupants as a unified system instead of as separate entities. As the countdown to the World Building Congress continues, go to www.cib2004.ca for regular updates.

For more information on CIB 2004, or to register, contact Mr. Harris Cunningham, Marketing Manager, NRC/IRC at (613) 991-2987, fax (613) 993-3142, or e-mail harris.cunningham@nrc.gc.ca.

MEWS project produces long-term moisture response indicator

Builders and building designers will be interested in the latest advance to emerge from IRC's Consortium for Moisture Management for Exterior Wall Systems (MEWS) project. It's a novel long-term moisture response indicator for parametric analysis called the RHT index, which is an important tool in the MEWS methodology (see sidebar, p. 7).

When used in conjunction with IRC's hygrothermal modelling tool called *hyg*IRC, the RHT index can provide the design community with information that can help them in choosing the building materials and type of wall assembly to use, as well as in determining the need for location-specific construction details. IRC is currently working with industry partners to advance the application of this new information.

The RHT index quantifies the amount of moisture in a specified part of the building envelope in terms of relative humidity and temperature. Using the model, these factors are recorded every 10 days for two years. At the end of the two years, the quantities are totalled to give the RHT index value. Higher RHT index values indicate greater potential for moisture-related deterioration.

This information becomes useful to a building designer, for example, in choosing a building material from a pool of available materials. Using parametric analysis with the RHT index, the designer can select the material that offers the highest potential for long-term moisture performance. Figure 1 shows the performance analysis results of three wood-based sheathing boards used in an exterior wall. Sheathing board 3 has the lowest RHT index value and, therefore, offers the best moisture performance in all four locations.

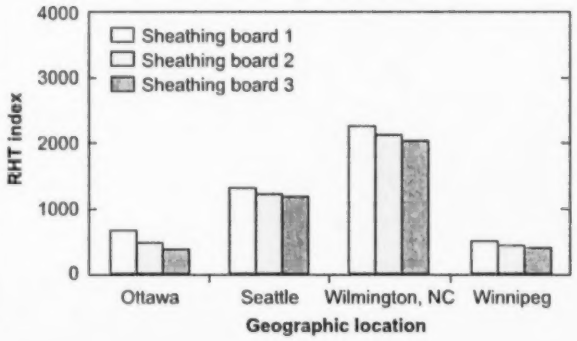


Figure 1. Performance of three different sheathing boards used in an exterior stucco wall

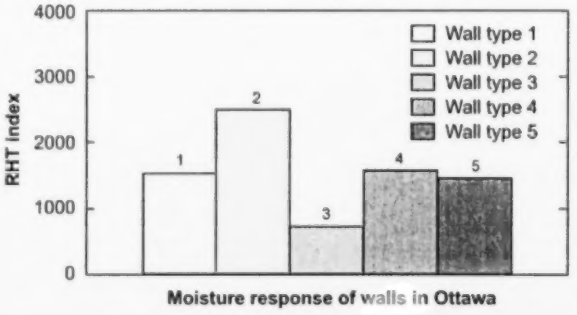


Figure 2. Performance of five different wall assemblies in Ottawa

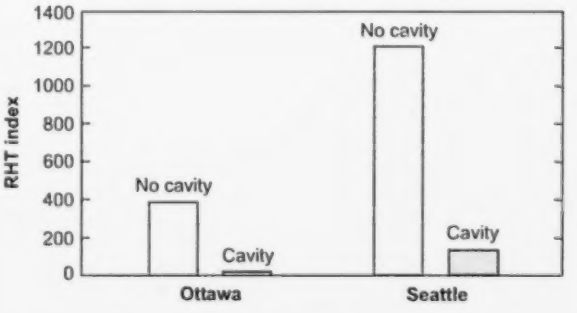


Figure 3. Effect of ventilated cavity behind exterior cladding

Similarly, the RHT index can help in the selection of the wall assembly that will offer the best performance for the exterior building envelope. Figure 2 shows the results from analyses done on five different wall assemblies in Ottawa. Wall type 3, with the lowest RHT index value, provides the highest level of performance for this location.

The RHT index can be used to assess the moisture performance of the building envelope in buildings such as these.

In addition, parametric analysis using the RHT index can also help to determine the relative benefit of additional construction details, such as a drainage cavity behind the exterior cladding or an overhang to deflect wind-driven rainwater. Figure 3 shows how the introduction of a ventilated cavity behind the exterior cladding can enhance the long-term moisture performance of the wall assembly by reducing the RHT index value.

For the next phase of this research, IRC is now seeking collaborators among members of the building envelope industry to establish threshold RHT index values (values above which deterioration starts) for various materials in different climatic conditions.

For the next phase of this research, IRC is now seeking collaborators among members of the building envelope industry to establish threshold RHT index values (values above which deterioration starts) for various materials in different climatic conditions. Those interested in participating, or those with specific questions about the RHT index, should visit the MEWS project Web site at http://irc.nrc-cnrc.gc.ca/bes/mews or contact Dr. Phalguni Mukhopadhyaya at (613) 993-9600, fax (613) 998-6802, or e-mail phalguni.mukhopadhyaya@nrc.gc.ca.

MEWS Consortium

IRC's Consortium for Moisture Management for Exterior Wall Systems (MEWS) was a four-year project that brought together researchers from IRC's Building Envelope and Structure Program, staff from its Codes and Evaluation Program, and 11 industry partners (see *Construction Innovation*, June 2002, for a complete list). The MEWS methodology offers a way for stakeholders in the building envelope industry to evaluate the ability of building components and systems to manage moisture in any geographic location in North America. For more information, visit the MEWS Consortium Web site at http://irc.nrc-cnrc.gc.ca/bes/mews.

Newsbrief

Second Canadian Construction Innovation Forum to be held in Calgary, May 25-27

In May, the construction industry will hold a special forum to establish the future direction of its innovation agenda in Canada.

The National Steering Committee for Innovation in Construction (NSCIC), led by the private sector, will report on its work at the Second Canadian Construction Forum in Calgary, May 25-27. At this time, it will present a proposal for the implementation of a national construction innovation strategy, request comments on this proposal and seek direction on its implementation.

This forum is a follow-up to an earlier one hosted by IRC in Ottawa in June 2001 where it was concluded that a strategic national approach to innovation was needed. As a result, the NSCIC was formed to develop a strategic plan to help address the challenges facing the industry, including improved productivity and profitability, and keeping the Canadian construction sector competitive.

Leaders from all segments of the construction sector—materials supply, design, contracting, property management, finance, research institutions and governments—are the target audience for this second forum, which will include presentations on how other countries approach the challenges around innovation and what constitutes best practice for firms in these countries as well as in Canada. The forum will also include addresses from key industry and government players.

For more information about this forum, please visit the Web site at www.nscic.ca or contact Mr. Chris Norris, Secretary of NSCIC, at (613) 993-0125, fax (613) 941-0822, or e-mail chris.norris@nrc.gc.ca.

Sealing of pavement cracks: melters affect sealant installation

Thermal cracks in asphalt pavements occur because of cyclic exposure to hot and cold temperatures; other cracks are the result of traffic. Left unattended, pavement has a short life. But with preventive maintenance its service life can be extended, with crack sealing providing a cost-effective approach.

During crack-sealing work (see photo), sealants are melted in large reservoirs, requiring tight temperature control. Temperatures that are too low cause an increase in sealant viscosity, which can prevent good adhesion during sealant application, while temperatures that are too high can lead to sealant degradation. Recommended installation temperatures are usually within a 20°C span, i.e., from about 175 to 195°C.

Following an extensive study of the chemistry of sealants, their thermal degradation and their properties, IRC researchers worked with contractors to measure the temperatures in three different types of sealant melter used in standard installations (see table), in order to better understand the effects of installation on sealant performance. The work allowed for a comparison of:

A crack-sealing train with the lead truck pulling the melter

- the melter's temperature gauge readings and recommended sealant application temperatures;
- the melter's temperature readings and independent thermocouple readings (conducted by researchers);
- the horizontal and vertical variations in temperature.

Comparison of gauge and thermocouple readings show, however, that melter gauges nearly always overestimate temperatures, by as much as 55°C.

It also permitted researchers to look at the efficiency of infrared (IR) thermoscopes in reading sealant temperatures.

The results indicate that contractors usually keep a close eye on application temperatures and aim for the lowest recommended temperature (i.e., 175°C) in order to minimize sealant thermal degradation. Comparison of gauge and thermocouple readings show, however, that melter gauges nearly always overestimate temperatures, by as much as 55°C.

Characteristics of sealant melters

	Stirring system	Stirring speed
Melter A	rocking bed	slow
Melter B	circumferential stirring	rapid
Melter C	circumferential stirring	medium

Experienced contractors who always use the same sealant are able to adjust to faulty gauges by a qualitative assessment of sealant viscosity. However, differences between the melter's temperature gauge and the actual sealant temperature (as measured by a thermocouple) can lead to disagreement between the contractor and the job inspector as to the sealant temperature that has to be maintained. IRC researchers found that this problem may be exacerbated by three factors:

1. the IR thermoscope used by inspectors may be unduly affected by sealant fumes and hence provide inaccurate readings;
2. the variation in temperature in the melter can be as great as 50°C;
3. the melter's stirring system determines this variation in temperature, with rapid circumferential stirring resulting in the smallest variation.

From this research, it can be concluded that the calibration of temperature gauges on sealant melters should become an integral part of construction specifications, and that sealant performance and durability may be affected by the variation in temperature that exists in melters. Temperature variations that cannot be controlled by contractors may lead to undue thermal degradation of the sealant during installation. This subject is being addressed in another IRC project that is developing performance-based guidelines for sealant selection. A complete report of the effect of melters on sealant temperatures is expected to be available soon at http://irc.nrc-cnrc.gc.ca/uir/ur/guidelines.html.

For more information, please contact Dr. J-F. Masson at (613) 993-2144, fax (613) 952-8102, or e-mail jean-francois.masson@nrc.gc.ca.

IRC researchers develop quality criterion for butt fusion of high-density polyethylene pipe

Researchers at IRC have developed a new quality criterion for butt fusion joining of high-density polyethylene (HDPE) pipe. This criterion is an important step forward in the quality assurance (QA) process associated with the construction or repair of buried water mains, which cost municipalities across North America billions of dollars each year. It should also prove to be a confidence-booster for municipal engineers who are considering using the technique in future projects.

IRC technical officer, Lyne Daigle, tests high-density polyethylene pipe samples to determine their tensile performance.

In the field, butt fusion is an efficient method for joining shipping-length HDPE pipe (up to 15 metres) to form longer installation lengths (up to 650 metres). Joints are known to be as strong as the parent pipe if they are made following proper procedures and under good environmental conditions.

Unfortunately, construction sites can pose challenges to maintaining good environmental conditions. The pipes are generally inserted where the ground has been excavated, which exposes the joints to dust and wind. Temperature and humidity can also have adverse effects. Because of these potential problems, on-site quality checks are essential to ensuring that the fused pipe joint meets the same durability requirements as the parent pipe.

To develop a criterion for carrying out this check, IRC researchers tested HDPE samples joined using butt fusion under simulated conditions involving dust and wind. Testing the samples to failure, the researchers established four failure modes related to the amount the joint could be elongated, ranging through bad, poor, good and excellent. The more the joint could be elongated, the better its performance.

With this criterion in place, conditions or procedures that result in unacceptable joints (that is, those that are rated "bad" or "poor" according to the criterion) can be identified and adjusted. In addition, this process will enable an optimal joining procedure to be developed for conditions at individual sites.

Currently, IRC is planning a second phase for this project to develop best practice guidelines for joining HDPE pipe using butt fusion. Those interested in participating, or those with specific questions about the fusion joint quality research to date, should contact Dr. Jack Q. Zhao at (613) 993-3802, fax (613) 954-5984 or e-mail jack.zhao@nrc.gc.ca.

CCA and IRC recognize industry achievements: Mammoet Canada Ltd. wins Excellence in Innovation Award

On February 13, the Canadian Construction Association (CCA) presented its annual awards to honour the outstanding contribution of individuals, companies and organizations within the Canadian construction industry. The awards were presented at CCA's 85th Annual Conference in Quebec City. The Institute for Research in Construction, proud sponsor of CCA's Excellence in Innovation Award, presented the award to Mammoet Canada Ltd. for its TITAN Bridge Lifting System. This system fulfills the main criterion established for this award: providing an "ingenious solution to a problem arising in the course of construction..."

The TITAN system, developed in 2000 and now being used in several projects, permits the removal of old bridges and quick installation of fully assembled new bridges. Its use of self-propelled modular transporters and climbing towers allows for quick demolition, rapid construction and installation, and even the recycling of existing bridges.

Honourable mentions were also given for the AutoCad and Total Station software integration used by a joint venture of PCL and Maxam in Regina, as well as to Cana Management Ltd. of Calgary for the removal of integrated structural columns.

The development and promotion of innovative ideas within the construction sector are top priorities for IRC. The Institute is therefore very pleased to support this major national construction award. Congratulations Mammoet!

What we're hearing

World Federation of Technical Assessment Organisations one step closer to worldwide assessments

Within sight of Windsor castle and in the home of one of Europe's famous architect-engineers, Sir Christopher Wren, the World Federation of Technical Assessment Organisations (WFTAO) met in September 2002 to further its objective of facilitating the transfer of national products to the global marketplace. Achieving this objective would benefit manufacturers of innovative construction products around the world.

The federation comprises 25 organizations from 21 nations, including assessment agencies within the three major trading areas: the Americas, Europe, and the Pacific Rim. The seventh gathering since its launch in 1996, this assembly was hosted and chaired by the British Board of Agrément (BBA).

Members agreed to a guideline for bi-lateral and multi-lateral evaluations among members of the federation, with the goal of facilitating simultaneous assessments of new products in two or more countries. Common assessment requirements would be established to avoid duplicate testing. National variations, required to satisfy country-specific needs, would be addressed separately.

In the sprit of cooperation, the U.S.-based International Conference of Building Officials Evaluation Service (ICBO-ES) and France's Centre scientifique et technique du bâtiment (CSTB) signed an agreement at the meeting to promote and further transatlantic trade. ICBO-ES and CSTB will work to provide the information their clients need to gain acceptance, recognition or approval of their products in the U.S. and in European markets. The Canadian Construction Materials Centre (CCMC), a founding member of the WFTAO, also used the opportunity to enhance its relationship with the BBA. A study is now underway to facilitate the acceptance of Canadian windows in the United Kingdom.

For more information on the World Federation of Technical Assessment Organisations, visit http://www.wftao.com or contact Mr. John Berndt, General Secretary, WFTAO at (613) 993-5353, fax (613) 941-0822, e-mail john.berndt@nrc.gc.ca.

We've recently renovated...

IRC's Web site has a new look and a new address. Come visit us at http://irc.nrc-cnrc.gc.ca and check out our renovations. You'll find a host of up-to-date information on topics such as acoustics and indoor air quality and, as usual, hundreds of free publications such as our Construction Technology Updates series.

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CI

Upcoming events

APRIL

23-25

20th CIB W78 Conference on Information Technology in Construction. Waiheke Island, Auckland, New Zealand. http://www.cs.auckland.ac.nz/w78/

MAY

7-10

"Innovation...breaking new ground." Ontario Association of Architects /Royal Architectural Institute of Canada Conference and Festival of Architecture. Toronto. http://www.oaa.on.ca/client/oaa/OAAHome.nsf/RenewalByType/16799170B8D9612C85256C3A00628AEC

25-27

2nd Canadian Construction Innovation Forum. Calgary. www.nscic.ca

29-30

Greening Rooftops for Sustainable Communities. The First North American Green Roof Infrastructure Conference, Awards and Trade Show. Chicago. http://www.peck.ca/grhcc/conference.htm

JUNE

8-10

The 3rd Canadian Conference on Geotechnique and Natural Hazards. Edmonton. http://www.geohazards2003.eba.ca/

JULY

13-16

Pipelines 2003. ASCE International Conference on Pipeline Technologies, Security, and Safety. Baltimore. http://www.asce.org/conferences/pipelines2003/

13-17

Healthy Buildings 2003. 7th International Conference: Energy-Efficient Healthy Buildings. Singapore. www.HB2003.org

14-15

JCI International Symposium. Latest Achievement in Technology and Research on Retrofitting Concrete Structures–Interface Mechanics and Structural Performance. Kyoto, Japan. http://www.jci-net.or.jp/english/text/conferences-2003071415.htm

16-18

16th Engineering Mechanics Conference (ASCE). Seattle. http://www.ce.washington.edu/em2003/

SEPTEMBER

14-17

Corrosion Control for Enhanced Reliability and Safety. Ottawa. Tel: (613) 998-4396, http://www.nacestore.com/nace/content/sarwebsites/special_links/NA2003EastCon.htm

27–Oct. 2

56th Annual Geotechnical Conference. Winnipeg. E-mail: dkingers@city.winnipeg.mb.ca

SEPTEMBER & OCTOBER

CCBFC Standing Committees meet to review public comment on proposed technical changes to the 1995 National Building, Fire and Plumbing Codes.

This calendar does not include all events scheduled to take place during this time frame. For a more complete listing, see the Web version of "Upcoming events" at http://irc.nrc-cnrc.gc.ca/events.html

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